Feb. 1, 1966 J. C. JAFFE 3,232,370

MULTI-FACET PORTABLE ACOUSTIC PANEL STRUCTURE

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FIG. 1.

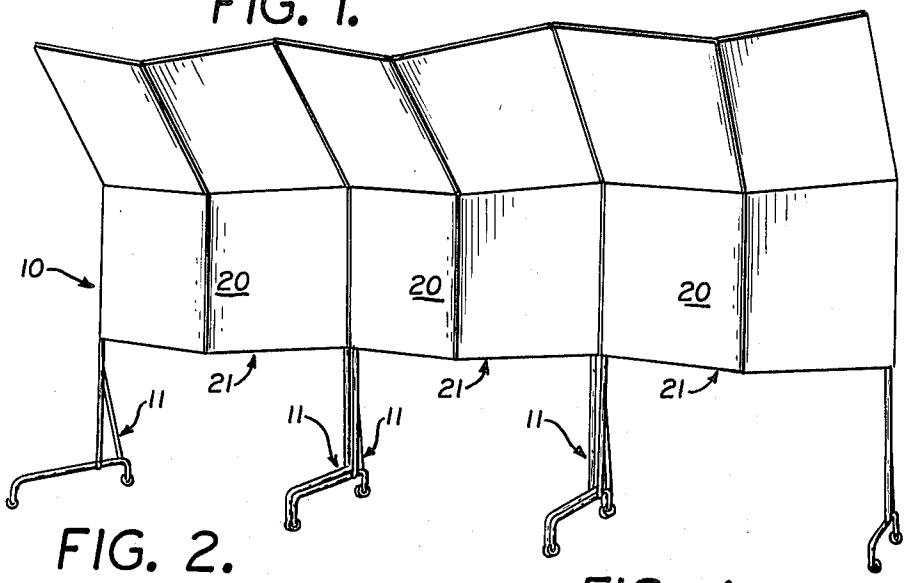


FIG. 2.

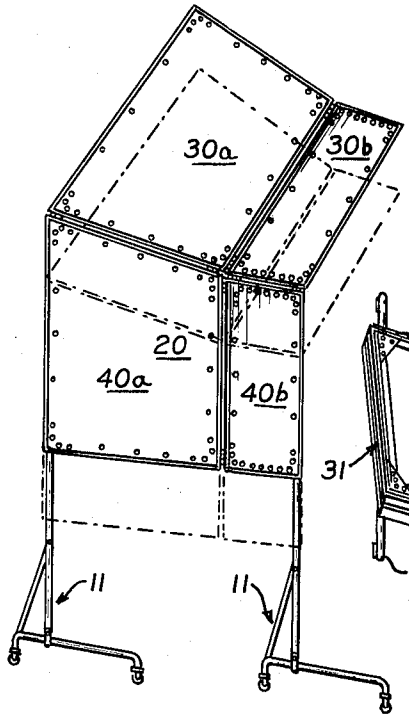
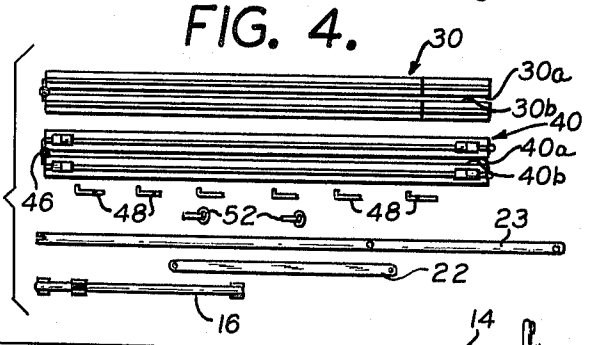


FIG. 4.



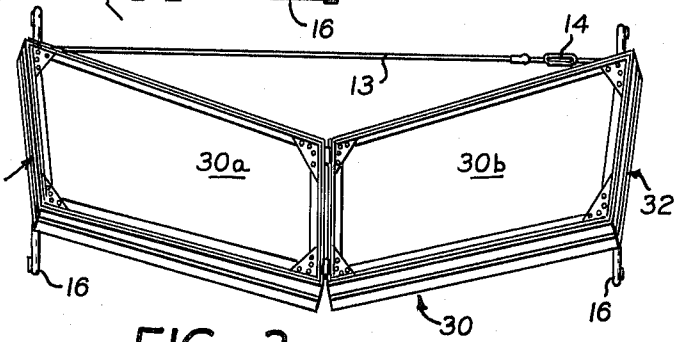


FIG. 3.

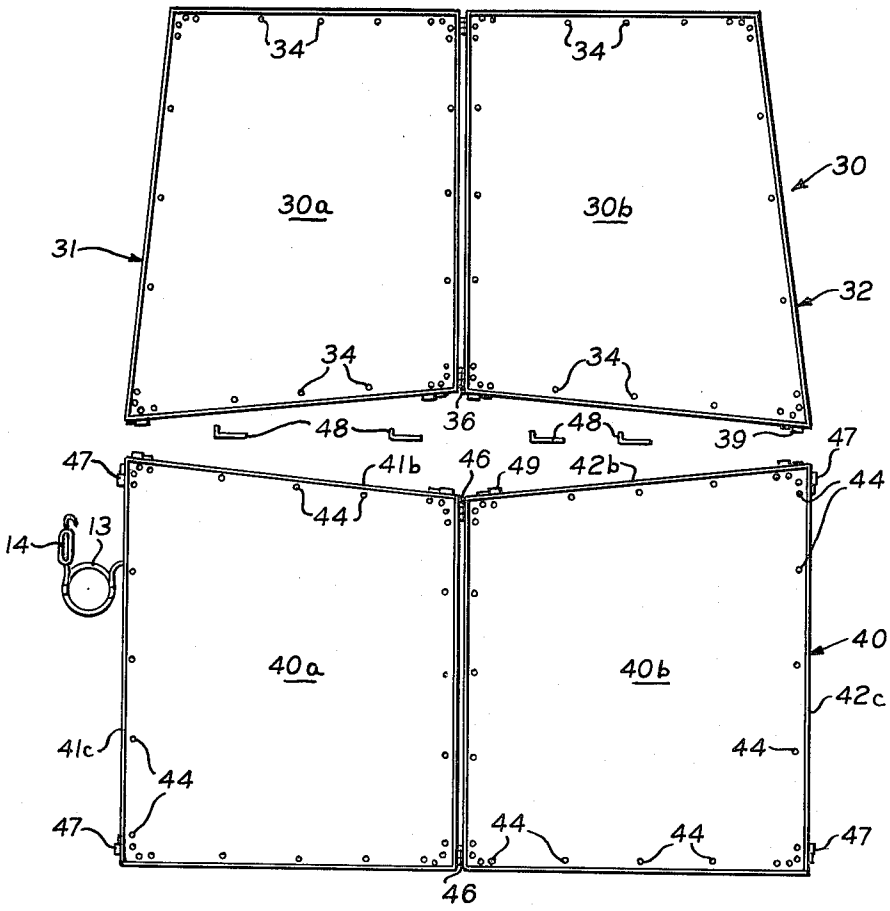
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MULTI-FACET PORTABLE ACOUSTIC PANEL STRUCTURE

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FIG. 5.



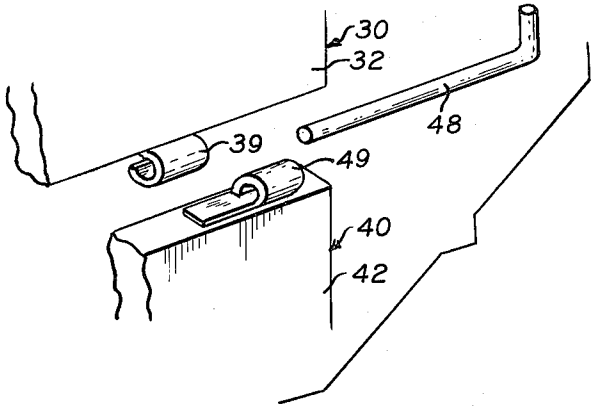


FIG. 14.

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MULTI-FACET PORTABLE ACOUSTIC PANEL STRUCTURE

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FIG. 6.

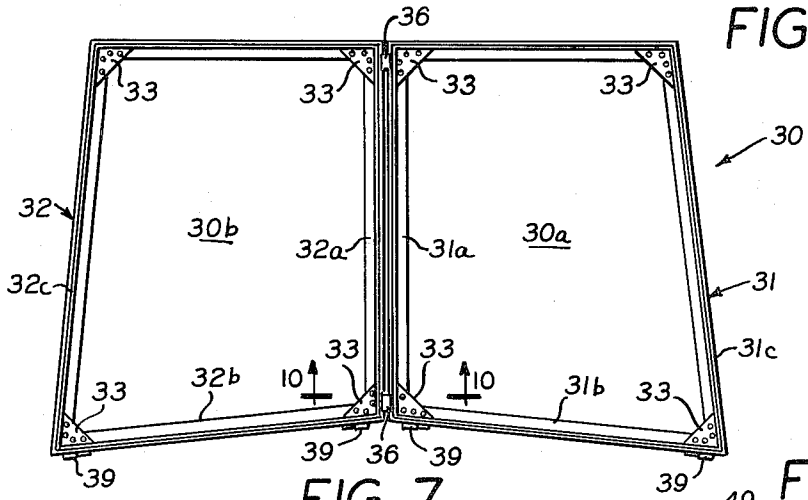


FIG. 7.

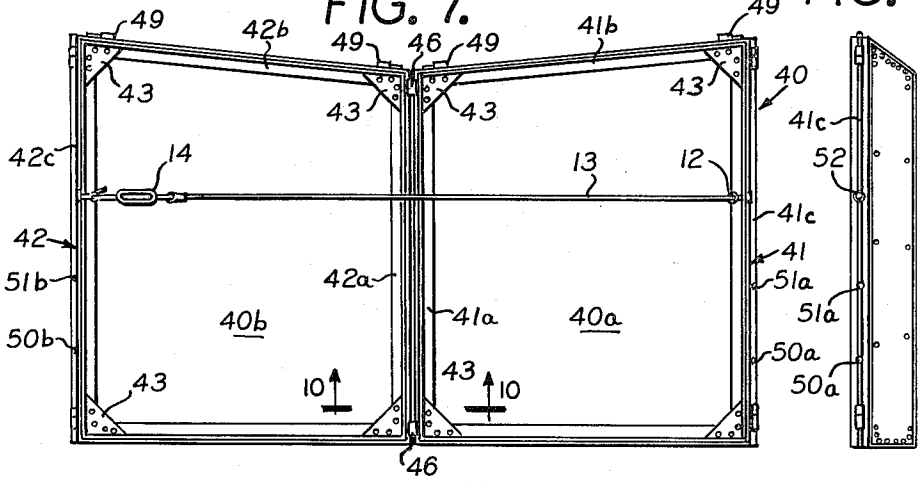
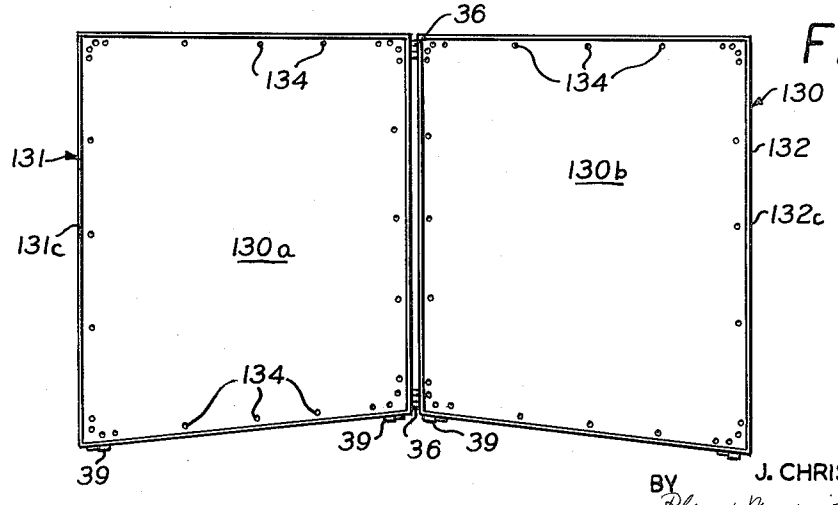


FIG. 8.

FIG. 9.



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FIG. 11.

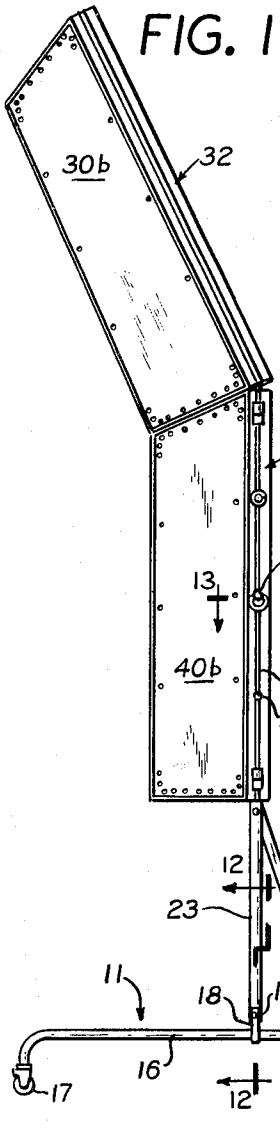


FIG. 10.

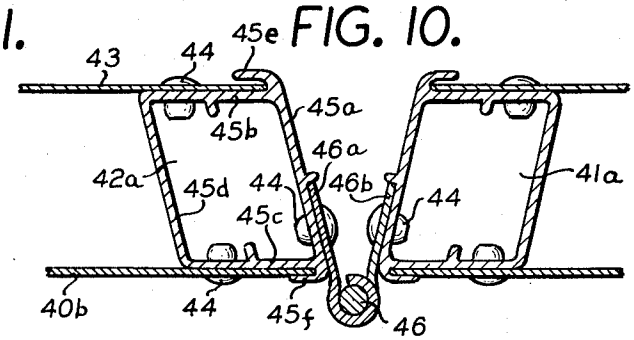


FIG. 12.

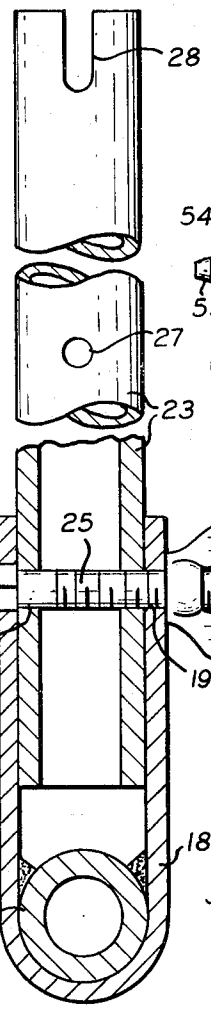
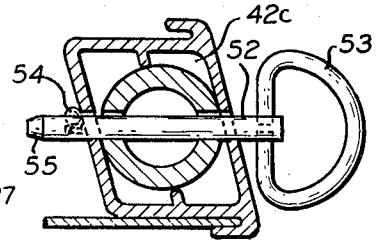


FIG. 13.



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United States Patent Office 3,232,370 Patented Feb. 1, 1966

3,232,370 MULTI-FACET PORTABLE ACOUSTIC PANEL STRUCTURE

John Christopher Jaffe, Norwalk, Conn., assignor to Stagecraft Corporation, Norwalk, Conn., a corporation of New York

Filed June 2, 1964, Ser. No. 371,925
13 Claims. (Cl. 181—30)

This invention relates to an acoustical shell and, more particularly, to a novel modular portable acoustical shell construction comprising multi-facet acoustical panels having sections which lie in different planes.

Portable or removable acoustical shell structures are used to improve the sound-reflecting acoustical properties of armories, gymnasiums, and similar types of large rooms which have inherently poor acoustical properties for instrumental or vocal concert purposes, as well as being used for outdoor performances of the same type. Thus, for example, one known construction involves a series of substantially vertical panels which must be mounted and braced in upright positions and a second series of ceiling panels which must be suitably supported by an overhead structure or the like. Obviously, a construction of this type is cumbersome and time consuming to erect. Additionally, and of more importance, the transportation of the panels which comprise the shell from one point to another is unnecessarily expensive since the panels must be trucked from place to place and they take up a large amount of storage space.

It is an object of the present invention to provide a portable acoustic shell comprising a plurality of multi-facet panels which can be folded to take up a minimum amount of space when transporting same and which unfolds to provide an efficient acoustical structure which improves the acoustical properties of a room.

It is another object of the present invention to provide a portable acoustic shell structure which is simple to erect, easy to handle and is relatively inexpensive to produce.

In accordance with the present invention, an acoustic shell construction is provided comprising a plurality of multi-facet relatively rigid panels of sound-reflecting material arranged to be secured together in substantially abutting juxtaposed relation to form the shell, the assembled shell and the individual panels being supported upon stands which allow the overall height of the individual panel constructions to be varied.

A particular feature of the invention is the acoustical construction of each panel. Thus, each panel includes a first or lower portion comprising a first pair of substantially identical segments which are hinged to one another along adjacent or inner side edges. Means are provided on the rear of the panels, connected to the outer side edges of the segments to connect the sections to maintain the panels in a position wherein the panels taper outwardly rearwardly from the hinged connection. The panels further comprise a second or upper portion comprising a second pair of substantially identical segments which are similarly hinged together along adjacent inner side edges. The respective top and bottom edges of the first and second portions which comprise the panel are provided with cooperating hinge locks which receive removable hinge pins so the top portion may be releasably secured to the bottom portion. The top edge of the lower pair of segments taper outwardly upwardly from the inner side edges and the bottom edges of the upper pair of sections taper outwardly downwardly from the inner side edges; the respective top and bottom edges of the portions being formed complementary to one another so, in the assembled condition, the top segments will likewise taper outwardly and rearwardly and will respectively

overhang the segments of the lower section to form respective obtuse angles therewith. Thus, each segment will lie in a different plane when the panel is assembled.

The segment surfaces are of a suitable sound-reflecting material, such as, for example, polyester resin-reinforced fiberglass. These fiberglass panels may be individually and rigidly connected to aluminum support frames. In the preferred embodiment, the outermost sides of the supporting frame form hollow tubes having an aperture in the bottom thereof which is adapted to receive a leg of the supporting structure. Two transverse apertures are provided in these sides of the frames and releasably receive a pin therein which is adapted to be received on the respective legs to mount the lower portion of the acoustic panel in upright position on the legs. The legs may be connected to castered bases and suitable reinforcing members between the base and the leg may be provided to add an overall structural rigidity to the particular panel. The shell is formed by placing a number of these panels in juxtaposed relation and securing these together along the outer side edges. When it is desired to store or transport the acoustic shell, the panels are separated and the upper and lower portions of each panel are taken apart and the segments of the respective portions are folded over the associated segment to form a compact unit which is approximately ¼ the size of the overall panel unit when assembled. The individual portions may be laid on top of one another to conserve space. As a subsidiary feature, the legs and castered bases may be separated to facilitate storage of the supporting structure.

It is a feature of the present invention to provide a multi-facet portable acoustic shell construction comprising a plurality of panels wherein each segment of a panel lies in a different plane.

It is a further feature of this invention to provide a multi-facet portable acoustic shell structure wherein the panels which comprise the shell may be disassembled and folded to a size which is approximately ¼ the size of the overall unit when it is assembled.

It is another feature of this invention to provide a plurality of multi-facet panels, each having interlocking means along their outermost side edges so a number of such panels may be connected together to form the portable acoustic shell construction.

Still another feature of the present invention is to provide a multi-facet portable acoustic panel structure whose height can be very easily varied in accordance with the acoustical properties desired.

The above and other objects and features of the present invention will become more apparent from a consideration of the following detailed description when taken in conjunction with the drawings in which:

FIG. 1 is a front perspective view, as viewed from the right, of an acoustical shell embodying the invention;

FIG. 2 is a front perspective view, as viewed from the left, of a single panel unit comprising the acoustical shell of FIG. 1;

FIG. 3 is a top elevational view of a single panel unit;

FIG. 4 is a top elevational view of a single panel unit when disassembled;

FIG. 5 is an exploded front elevational view of a panel preparatory to assembly;

FIG. 6 is a rear elevational view of a first embodiment of the top portion of the panel preparatory to assembly;

FIG. 7 is a rear elevational view of the bottom portion of the panel in assembled condition;

FIG. 8 is a side elevational view of the bottom section of the panel;

FIG. 9 is a front elevational view of a second embodiment of the top section of a panel preparatory to assembly;

FIG. 10 is a detailed sectional view along the lines **10—10** in FIGS. 6 and 7 of the connection between the frames;

FIG. 11 is a side elevational view of a panel unit constructed in accordance with the present invention;

FIG. 12 is a sectional view taken along the lines **12—12** in FIG. 11;

FIG. 13 is a cross-sectional view taken along the lines **13—13** in FIG. 11; and

FIG. 14 is an enlarged detail view of the hinge locks and pins connection of the present invention.

FIG. 1 illustrates an acoustical shell **10** made up of a plurality of separate panel units **21** comprising the panels **20** embodying the invention and secured together at adjacent side edges in upright juxtaposed relation. Each panel **20** is supported by a base structure **11** which maintains the panels in the upright position.

In a preferred embodiment, the individual panels **20** comprises an upper section **30** and a lower section **40** (FIG. 5). Lower section **40** comprises a pair of segments **40***a* and **40***b* of sound-reflecting material such as a polyester resin reinforced Fiberglas. As shown in FIG. 7, panels **40***a* and **40***b* are connected to suitable frames **41** and **42**, respectively, adjacent their peripheral edges by any conventional means such as rivets **42**, to maintain the segments taut over the area defined by the frame. Hence, the shape of the segments conform to the shape of the frame. In the preferred embodiment frames **41** and **42** will be made of extruded aluminum tubular members so the overall expense of the shell will be kept at a minimum and the complete structure will be lightweight. Gusset plates **43** may be provided at the corners of each frame to reinforce the frame and add a structural rigidity to the overall lower section **40**. Gusset plates **43** may be connected to the respective frame by rivets or any other conventional means.

FIG. 10 illustrates in detail the connection between the gusset plates, the sound-reinforcing segments, and the tubular aluminum frame; it being understood that each portion of the frame is similarly connected to the respective acoustical panel segment and gusset plate. Member **42***a* of tubular frame **42** comprises a longitudinally extending outer wall **45***a* and laterally extending rear and front walls **45***b* and **45***c*, respectively, which are parallel to one another and are connected at their remote ends by inner wall **45***d* which is parallel to wall **45***a*. Wall **45***a* is provided with an extended portion which forms downturned flanges **45***e* and **45***f* which are respectively spaced from and parallel to laterally extending walls **45***b* and **45***c* to form receiving channels. Gusset plate **43** is received within the channel defined by flange **45***e* and wall **45***b* in abutting relation to the connection between wall **45***a* and flange **45***e* and is secured in place by rivet **44**. Acoustical panel segment **40B** is similarly received within the space defined by flange **45***f* and wall **45***c* in abutment with the extension between rear wall **45***a* and flange **45***f* and is similarly affixed in place by a rivet **44**. This type of reinforcing construction contributes to the strength of the entire structural arrangement of the present innvention. In the preferred embodiment, all panel segments are connected to the respective tubular frame in a similar manner.

The outer wall of adjacent side members **42***a* and **41***a* of the respective frames **42** and **41** are connected together by hinges **46** adjacent the top and bottom members of the frame. As shown in FIG. 10, plate **46***a* of hinge **46** is connected to wall **45***a* of member **42***a* by rivet **44** and plate **46***b* is similarly connected to member **41***a* by a rivet **44**. Thus, segment **40***a* may be folded over and superposed on segment **40***b* to form a compact unit, as illustrated in FIG. 4, when the panels are disassembled and stored. Additionally, the extent that the segments may be rotated or opened away from each other will be limited since the outer walls of members **41***a* and **42***a* will abut each other.

The respective top members **41***b* and **42***b* of respective frames **41** and **42** taper upwardly outwardly from the hinged members for reasons which will be set out hereinbelow. Side members **41***c* and **42***c* of the respective tubular frames **41** and **42** are provided with the hinge locks **47** which cooperate with complementary placed hinge locks on adjacent panels to receive the hinge pins **48** to securely lock adjacent panel units together in juxtaposed relation to form acoustical shell **10**.

Eye bolt **12** (FIG. 7) extends through member **41***c* and is secured thereto by any conventional means such as a nut. A cable **13** is connected to eye-bolt **12** in any conventional manner and, at its other end, is connected to a turnbuckle **14**. A second eye-bolt **15**, which is located in the same plane as bolt **12**, is similarly connected to the tubular member **42***c* and is adapted to receive the hook end of the turnbuckle, as noted below.

In a first embodiment, upper section **30** of panel **20** comprises segments **30***a* and **30***b* of sound-reflecting material which are respectively connected to the tubular frames **31** and **32** adjacent their peripheral edge, so the sound-reflecting surfaces **30***a* and **30***b* assume the contours of the respectively associated frames, by any conventional means such as rivets **34**. Gusset plates **33** are connected to each frame at the corners thereof to reinforce and strengthen the tubular frame. Side members **31***a* and **32***a* of respective frames **31** and **32** are hinged together by the hinges **36** which are spaced from the respective upper and lower members of the frame in the same manner as lower section was connected. Thus, surface **30***a* may be folded over and superposed on surface **30***b* when the upper section is disassembled to take up a minimum of space as shown in FIG. 4, thereby facilitating storage and transportation of the unit. Similar to section **40**, the opening of separation of segments **30***a* and **30***b* will be limited by the abutting of members **31***a* and **32***a*.

The bottom members **31***b* and **32***b* of the respective tubular frames **31** and **32** taper outwardly, downwardly from the hingedly connected side member **31***a* and **32***a* for the reasons noted below. Moreover, the side members **31***c* and **32***c* of frames **31** and **32** taper upwardly inwardly toward the hinged members from bottom to top. Members **31***b* and **32***b* are provided with hinge locks **39** spaced from each end and are formed complementary to the hinge lock **49** on the top edge of members **41***b* and **32***b* of section **40** so the respective locks **39** and **49** may be aligned with each other and hinge pin **48** inserted therethrough to releasably secure upper section **30** to lower section **40**.

Base structure **11** (FIGS. 11 and 12) comprises a horizontally projecting tubular bar **16** provided with downturned portions at each end which are adapted to receive the respective shafts of casters **17** therein in the well known manner so the panel units will be movable when assembled. Strap **18** may be welded to bar **16** adjacent one end thereof and is in the shape of a U as viewed from the front with the bight of the U engaging the undersurface of bar **16**, aligned apertures **19** are provided in the legs of strap **18** adjacent the end thereof. Supporting strut **22** is pivotally connected to bar **16** at the downturned end adjacent strap **18** by such means as, for example, a screw and wing nut so strut **22** may be tightened in place. Leg **23** is connected to bar **16** and supports panel **20** thereon. Thus, tubular leg **23** is provided with an aperture **24** adjacent the bottom thereof. This aperture is adapted to be aligned with aperture **19** in strap **18** so a bolt **25** may pass therethrough to receive wing nut **26** on the end thereof which may be tightened in place to secure leg **23** to horizontal bar **16**. A second aperture **27**, which is spaced approximately one-third of the length of leg **23** from the bottom end thereof, is adapted to be aligned with a corresponding aperture (not shown) in the top of strut **22** so a screw or bolt may be passed through aperture **27**

and the aperture in strut **22** and affixed in place by a wing nut which engages the threaded end of the bolt to form a rigid base structure. It is noted that the axis of aperture **27** is transversed to the axis of aperture **24**. The top of leg **23** is provided with a slot **28** for reasons which will become apparent.

Tubular members **41***c* and **42***c* of lower portion **40** are provided with bores at the bottom thereof (not shown) which are adapted to receive respective legs **23** therethrough from the respective base structures **11** with leg **23** projecting vertically within the interior of hollow members **41***c*, **42***c* (FIG. 13). Apertures **50***a* and **51***a* provided through tubular member **41***c* in a direction transverse to the axis of member **41***c* and are respectively aligned with similarly placed apertures **50***b* and **51***b* in tubular member **42***c*. These apertures are spaced from one another in a vertical direction and are spaced from the bottom edge of respective frames **41** and **42** for a reason which will become apparent hereinbelow.

Assembling the unit

During transportation or storage of a panel unit, the segments of the respective upper and lower portions will be superimposed on each other in the manner illustrated in FIG. 4 while the base structure **11** will be disassembled as similarly shown in FIG. 4, it being understood that a second basic structure is provided. When it is desired to erect the multi-facet panel of the present invention, the segments **40***a* and **40***b* of lower section **40** are unfolded and turnbuckle **14** is connected to eyebolt **28**. The length of cable **13** is such that segments **40***a* and **40***b* cannot be opened to lie in the same plane but must form a V-shape as viewed from above with segments **40***a* and **40***b* tapering outwardly rearwardly from hinged members **41***a* and **42***a*. Turnbuckle **14** may be adjusted in the conventional manner to vary the degree of taper within limits. That is, the length of the cable and turnbuckle is less than the total longitudinal length of the two segments but greater than the longitudinal length measured from **41***c* to **42***c* when members **41***a* and **42** are abutting one another.

Upper section **30** may then be opened and placed upon lower section **40** with the holes in adjacent hinge locks **39** and **49** in alignment. Hinge pins **48** may then be inserted through the respective hinge locks to secure upper portion **30** to lower portion **40**. Due to the taper of the respective upper and lower tubular members of upper and lower portion **30** and **40**, respectively, upper portion **30** will assume an outwardly rearwardly taper as that of lower portion **40** but will overhang lower portion **40** to some extent with respective hinges **36** and **46** lying in the same vertical plane. Segment **30***a* will make an obtuse angle with respect to segment **40***a* (FIGS. 2 and 3) and, similarly, segment **30***b* will make an obtuse angle with respect to segment **40***b*. Thus, segments **30***a* and **30***b* will lie in different planes and these planes will be different from the planes that segments **40***a* and **40***b* lie in. Hence, each segment will lie in a different plane thereby affording 4 differently oriented sound-reflecting or disbursing surfaces. When fully assembled, the weight of the various segments will tend to cause the segments to fold on one another in the normal manner; however, the connection of cable **13** between members **41***c* and **42***c* prevents this from occurring.

The base structure may then be assembled with leg **23** being received in strap **18** and screw **25** inserted through the respective apertures **19** and **24** with strut **22** holding leg **23** upright by means of the connection through aperture **27**. Legs **23** will be received in tubular members **41***c* and **42***c*, as shown in FIG 13. Respective pins **52** are adapted to extend through tubular members **41***c* and **42***c* through either apertures **50***a* and **50***b* or **51***a* and **51***b*. Pins **52** are provided with a ring **53** at the end thereof to facilitate grasping of the pin by the hand. A spring loaded ball **54** is received adjacent the end of pin **52**, the end of which may be tapered as at **55** to facilitate the insertion of pin **52** into the desired bore. Thus, in FIG. 11, pin **52** is shown inserted in aperture **51***b*. Pin **52** is inserted until spring loaded ball **54** extends past the inner wall of the tubular member and is biased outwardly to maintain the pin in place. Legs **23** may then be inserted into the tubular member with pin **52** being received within slot **28** to thereby mount panel **20** to the base structure **11**.

The height of panel **20** from the floor may be varied depending upon whether the pins **52** are received in apertures **50***a*, **50***b*, or apertures **51***a*, **51***b*. When the pins are received in apertures **51***a*, **51***b*, the height of panel **20** will correspond to the solid line portion of FIG. 2. When the pins are received within apertures **50***a*, **50***b*, the height of the panel **20** will be as indicated by the dotted line portion of FIG. 2. Legs **23** are spaced close to one end of horizontal bar **16** to overcome the turning moment generated by the top heavy panel **20**.

The assembled units **21** may be joined to each other to form a shell **10** by placing the lower portions **40** of each unit together so the holes in the complementary hinge locks **47** are aligned with each other and inserting hinge pins **48** therethrough to maintain the panels in upright juxtaposed position.

In accordance with the objects of the present invention, I have provided a novel and extremely portable multi-facet acoustic panel which may be joined to similar panels to form a shell.

FIG. 9 illustrates a second embodiment of the present invention which comprises an upper portion **130** having segments **130***a* and **130***b* which are respectively connected to frames **132** and **131** adjacent their outer peripheral edge by any conventional means such as rivets **134** so segments **130***a* and **130***b* conform to the shape of the respective mounting frames.

In this embodiment, members **131***a* and **132***a* of respective frames **131** and **132** are vertical rather than tapering upwardly and inwardly from the bottom member as shown in the embodiment illustrated in FIG. 6.

It should be noted that the bottom edges of upper section **130** similarly taper outwardly, downwardly as shown in conjunction with upper section **30**. Thus, upper section **130** will assume essentially the same position as upper section **30** did when the upper section **130** is mounted upon lower section **40**.

When it is desired to disassemble the unit, the above noted steps relating to the assembling of same are reversed and the unit may be compactly folded for transportation or storage, as shown in FIG. 4.

By using the panel units comprising the invention, a shell can be easily and quickly erected. Moreover, the panels may be readily supported on accompanying stands which allow their height to be varied in accordance with the desired arrangement. The segments of each panel lie in separate planes to define a multi-facet acoustical structure which is relatively light in weight and which folds up to a compact size so the entire shell or individual units of same are fully transportable, and it will be further noted that the panels may be compactly superimposed on each other for storage and transportation purposes. The acoustical properties, due to the multi-faceted segments which lie in different planes of the shell are excellent.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. For use in assembling an acoustical shell, a panel of sound-reflecting material arranged to be secured to similar panels in substantially abutting juxtaposed upright relation to form said shell; said panel including a lower section comprising a first pair of substantially identical

segments each having side and top and bottom edges, said first pair of segments having cooperating elements along adjacent side edges to hingedly secure one segment to the other so one of said segments may be superimposed over the other of said segments for storage of said lower section; first means connected to the remote side edges of said segments adapted to maintain each of said segments in a predetermined position wherein each of said segments extends outwardly rearwardly from the hingedly connected edges when said lower section is in use; said panel further including an upper section comprising a second pair of substantially identical segments each having side and top and bottom edges, said second pair of segments having cooperating elements along adjacent side edges to hingedly secure one segment to the other so one of said segments may be superimposed over the other of said second pair of segments for storage of said upper portion; cooperating elements connected to the respective top and bottom edges of said first and second pair of segments adapted to releasably connect said upper and lower portions together; the respective top and bottom edges of the lower and upper sections having complementary tapers such that the segments of said upper section respectively make an obtuse angle with respect to a different one of said segments of said lower section when said sections are releasably connected together.

2. For use in assembling an acoustical shell, a panel of sound-reflecting material arranged to be secured to similar panels in substantially abutting juxtaposed upright relation to form the shell; said panel including a lower section comprising a first pair of substantially identical rectangular segments each having side and top and bottom edges; said first pair of segments having cooperating elements along adjacent side edges to hingedly secure one segment to the other, said segments extending outwardly rearwardly from the hinged side edges, first means connected to the remote side edges of said segments to maintain said segments in said position; said panel further including an upper section comprising a second pair of substantially identical segments, each having side and top and bottom edges, said second pair of segments having cooperating elements along adjacent side edges to hingedly secure one segment to the other, means for releasably connecting said upper section to said lower section, the top edge of asid bottom section and the bottom edge of said top section having complementary tapers so respective segments of said upper portion form obtuse angles with respective segments of said lower portion and the segments of said upper section taper outwardly rearwardly from said hinged side edges.

3. An acoustical shell forming panel, as defined in claim 2, wherein the top edges of said lower section taper upwardly outwardly from the hinged side edges and said bottom edges of said upper section tapers outwardly downwardly from the hinged side edges.

4. An acoustical shell forming panel, as defined in claim 2, wherein the remote side edges of said upper section taper upwardly inwardly toward said hinged edges.

5. An acoustical shell forming panel, as defined in claim 2, wherein said means for releasably securing said top and bottom sections comprises complementary formed hinge locks adjacent the ends of each segment of the respective top and bottom edges of said lower and upper sections, and hinge pins secured in each of said hinge locks, said hinge pins being provided with a handle to facilitate removal of same.

6. An acoustical shell forming panel, as defined in claim 2 and means connected to the remote side edges of said lower section for connecting adjacent panels together, said means comprising hinge locks adjacent the ends of the side edges adapted to be aligned with complementary formed hinged locks on other panels, and hinge pins adapted to be inserted through said hinge locks when the panels are placed together and the hinge locks aligned to maintain the panels in place.

7. For use in assembling an acoustical shell, a panel of sound-reflecting material arranged to be secured to similar panels in substantially abutting juxtaposed relation to form the shell; said panel including a lower section having a first pair of substantially identical tubular frames including side and top and bottom members, sound-reflecting material secured to each of said frames so said material conforms to the shape of said frames, adjacent side members of said frames having cooperating elements to hingedly secure one frame to the other, said frames lying in vertical planes that extend outwardly, rearwardly from said hinged members, first means connected to the remote side members of said frames to maintain each of said frames in its respective plane; said panel further including an upper section having a second pair of tubular frames comprising side and top and bottom tubular members, sound-reflecting material secured to each of said second pair of frames whereby said sound-reflecting material conforms to the shape of said frames, said second pair of frames having cooperating elements along adjacent side members to hingedly secure one frame to the other, means connected to the top members of asid lower section and complementarily formed means connected to the bottom members of said upper section for releasably securing said lower section to said upper section, the bottom members of each of said frames comprising the upper section and the top members of each of said frames comprising the lower section being complementarily tapered so respective frames of said upper section form obtuse angles with respect to respective frames of said lower section, and the frames of said upper section lie in planes which extend outwardly rearwardly, from said hinged members, and supporting means for maintaining and supporting said panel in an upright position.

8. An acoustical shell forming panel as defined in claim 7, wherein the remote side tubular members of the frames forming the lower section are provided with apertures at the bottom thereof, said base structure including respective legs which are received through said apertures, within said tubular side members, and means extending across the tubular side member and engageable with said legs to prevent further penetration of the legs in said tubular side members beyond said means to mount said panel on said legs.

9. An acoustical shell forming panel, as defined in claim 8, wherein each of said remote side tubular members of the frames comprising the lower section are provided with aligned apertures which are spaced from each other along the height of the unit, said apertures having axes which are perpendicular to the axis of the tubular members, and a pin adapted to be inserted through an aligned pair of said apertures in the remote side members and engageable with the leg to mount the panel on said leg at a predetermined height with respect to the bottom of said base structure.

10. An acoustical shell comprising, in combination, a plurality of panels of sound-reflecting material, arranged to be secured together in substantially abutting juxtaposed relation to form the shell; each of said panels including a lower section comprising a first pair of substantially identical segments each having side and top and bottom edges, said first pair of segments having cooperating elements along adjacent side edges to hingedly secure one segment to the other, said segments being in a predetermined position wherein the segments extend outwardly, rearwardly to form a V as viewed from above, means connected to the remote side edges of said segments adapted to maintain each of said segments in a predetermined position; each of said panels further including an upper section comprising a second pair of substantially identical segments each having side and top and bottom edges; said second pair of segments having cooperating elements

along adjacent side edges to hingedly secure one segment to the other, and cooperating elements connected to the respective top and bottom edges of said first and second pair of sections for releasably connecting said upper and lower sections together; the top edge of said lower section and the bottom edge of said upper section being provided with complementarily formed tapers such that respective segments of said upper section form obtuse angles with respect to respective segments of said lower section and each of the upper segments extend outwardly rearwardly from the hinged edges, means provided along the remote side edges of said lower sections for connecting adjacent side edges of adjacent panels together to form the acoustical shell, and a base structure for supporting said shell.

11. An acoustical shell as defined in claim **10**, wherein the bottom edges of the upper section of each panel taper outwardly downwardly from said hinged edges, and the upper edges of said lower sections of each panel taper outwardly upwardly.

12. An acoustical shell as defined in claim **10**, wherein the side edges of each of said top sections taper upwardly inwardly toward said hinged edges.

13. An acoustical shell as defined in claim **10**, wherein complementarily formed hinges are connected to the remote edges of adjacent panels adjacent the top and bottom of said lower section and are adapted to be aligned with complementarily located hinge locks on adjacent panels, and hinge pins adapted to be received within said hinge locks when so aligned for securing said panels to each other in juxtaposed relation.

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